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Stable, enzyme containing granulates

EP 193829 describes a method for production of dust free enzyme containing particles with a core and an enzyme containing shell. As core materials sucrose, kaolin and potato starch are indicated. As enzymes proteases, amylases and lipases are indicated.

It has been found that granulates with a core material consisting of a salt free carrier and with a shell containing lipase and/or mutanase and/or protease and/or catalase and/or glucose oxidase and/or peroxidase also exhibit an excellent enzyme stability. The salt free carrier can be e.g. lactose and/or sucrose and/or glucose and/or starch and/or maltodextrin. Thus, the following enzyme-core pairs can be used with advantage, if an excellent enzyme stability is wanted: lipase-lactose, lipase-sucrose, lipase-glucose, lipase-starch, lipase-maltodextrin, mutanase-lactose, mutanase-sucrose, mutanase-glucose, mutanase-starch, mutanase-maltodextrin, protease-lactose, protease-sucrose, protease-glucose, protease-starch, protease-maltodextrin, catalase-lactose, catalase-sucrose, catalase-glucose, catalase-starch, catalase-maltodextrin, glucose oxidase-lactose, glucose oxidase-sucrose, glucose oxidase-glucose, glucose oxidase-starch, glucose oxidase-maltodextrin, peroxidase-lactose, lipase-sucrose, peroxidase-glucose, peroxidase-starch, peroxidase-maltodextrin.

The following enzymes can advantageously be used: lipase from <u>Humicola insolens</u>, catalase from <u>Aspergillus niger</u>, protease from <u>Bacillus licheniformis</u>, glucose oxidase from <u>Aspergillus niger</u>, mutanase from <u>Trichoderma harzianum</u>, and peroxidase from <u>Coprinus cinereus</u>.

Granulates of this kind, e.g. a catalase granulate on a core of sucrose, can be produced as follows. The dust free granulate is produced in a laboratory fluid bed, "Uni-glatt" from Glatt GmbH. The nozzle used for spraying is a two fluid nozzle G.S.940, and the pressure of the atomizing air is 1.2 bar.

780 g of catalase concentrate with a dry matter content of 14.3% is sprayed onto the surface of the sucrose core material with a particle size of approx. 80% within 0.20-0.40 mm. The liquid is sprayed onto the core at a rate of approx. 200 g/hr to avoid agglomeration. The air inlet temperature is 55°C and the outlet temperature is 40°C. The air flow is adjusted for generation of an effective suspension of core material in the drying chamber.

The product is dried 5 minutes in the fluid bed.

The recovery calculated from a mass balance was 93%, and the activity yield was 78%.

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<u>METHODS OF BRIQUETTING.</u>

Briquetting may in general employ operational concepts of pressing and/or casting incl. means or devices for the dewatering and/or drying of materials in particulate or plastic state to form shaped articles of convenient sizes having the proper qualities of strength to facilitate storage and transportation, as the briquets or pellets may serve the reuse of a wide range of waste-materials that should otherwise have to be dumped, thereby avoiding the need to search for ways of safe depositing, eventually also combined with different choices of pretreatment of such waste to alter or totally remove any present or future possible threat against the environment, thus at the same time offering considerable savings when the briquets can be regarded as a most useful surplus of raw-materials, that may further easily be worked to comprise exactly the correct specification for the reuse in question, e.g. in the production of patent fuel, pig-iron, glass or mineral fibre products, where such types of waste tend to have certain unwanted toxic characteristics that can be blocked temporarily, e.g. by using a hydraulic binder, such as bentonite, clay or concrete,to shape the briquets, or the toxic parts may be burned off during a hot-briquetting procedure e.g. in a sintering process that may take place on a travelling grate or an endless conveyor upon which a composition containing the waste-material together with the selected admixture is laid to form a web-like configuration, where the speed of the conveyor is continuously regulated according to parameters such as the total mass-flow, e.g. the thickness and the density, the temperatures and the emission of combustive gases from the upper surface of the moving web and/or the rate of combustion air to be forced through the said composition containing solid fuel particles and mineral wool waste, the solid fuel constituting between 5 and 15 % by weight of said mineral waste where said composition may also contain one or more fluxes such as limestone, calcined and hydrated lime, dolomite and olivine, the amount of flux preferably being between 1 and 40% by weight of the mineral wool waste, further said composition of sintering material may be constituted of by weight 55% fly-ash + 25% slag + 20% dolomite or 45% fly-ash + 30% slag + 10% waste from the production of mineral wool fibres, where the fly-ash generally contains a sufficient amount of carbonaceous fuel to support said sintering process as said upper surface is lightened and kept burning at the proper temperatures eventually assisted by an extra supply of combustible gases which may be added to said combustion air and may partly consist of recirculated quantities of unburned gases that may contain unburned residuals, thus creating a resulting sintered layer having the porosity and the adequate tensile strength required to being finally divided into correctly sized pieces of rawmaterial-briquets, e.g. to be fed into a cupola-shaft-furnace.

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